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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/881,769	06/18/2001	Izuru Nakai	P21131	8245

7055 7590 11/04/2002

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EXAMINER

STAICOVICI, STEFAN

ART. UNIT	PAPER NUMBER
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1732

DATE MAILED: 11/04/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application N .

09/881,769

Applicant(s)

NAKAI ET AL.

Examiner

Stefan Staicovici

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on October 23, 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4 is/are pending in the application.
- 4a) Of the above claim(s) 4 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☒ Claim(s) 1-4 are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 June 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Election/Restrictions

1. Applicant's election with traverse of Group I, claims 1-3 in Paper No. 5, is acknowledged. The traversal is on the ground(s) that the restriction requirement did not include an "exemplary apparatus that would perform the claimed process," but rather set "forth an alternative process to achieve results similar to the claimed process" (see page 2 of the response filed October 23, 2002).

In response, it should be noted that the restriction requirement mailed September 23, 2002, stated that "the process as claimed can be practiced by another and materially different apparatus, such as a laser process including, increasing/decreasing the laser power to trim the inner surface of the resulting hole by moving the position of the focal point as determined by a converging lens." Hence, it is submitted that the "exemplary apparatus that would perform the claimed process" is a laser apparatus that has a converging lens that is moved in order to modify the spot size and the focal point, rather than modifying the laser pulse energy using a control device. However, in order to clarify the restriction requirement, a new restriction requirement is set forth as shown below:

2. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 1-3, drawn to a laser process, classified in class 264, subclass 400.
 - II. Claim 4, drawn to a laser apparatus, classified in class 219, subclass 121.83

The inventions are distinct, each from the other because of the following reasons:

3. Inventions Group I and II are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced

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by another materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case, the process as claimed can be practiced by another materially different apparatus, such as laser apparatus that has a converging lens that is moved in a vertical direction to the target in order to modify the spot size and the focal point, rather than modifying the laser energy using a control device.

4. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

Specification

5. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed. The following title is suggested: "Method of Laser Drilling."

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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7. Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ayrton (US Patent No. 5,741,456) in view of WO 86/02301 and in further view of Temple *et al.* (US Patent No. 6,228,311 B1).

Ayrton ('456) teaches the basic claimed process of drilling a hole in a multi-layered sheet using a laser without delamination of said multi-layered sheet occurring (see col. 2, line 53 through col. 3, line 18). It is submitted that since delamination is avoided, that the resulting inter-layer pull-off force is smaller than an inter-layer adhesion force.

Regarding claim 1, Ayrton ('456) does not teach a first train of low-powered laser pulses to drill said hole in said multi-layered sheet and a second train of higher power pulses to trim said drilled hole. WO 86/02301 teaches the claimed process of laser drilling a multi-layer sheet by providing a train of low-powered laser pulses to drill through said multi-layered sheet, said low powered pulses preventing delamination, and after said multi-layered sheet has been drilled, higher power pulses are employed. It is submitted that since delamination is avoided, that the resulting inter-layer pull-off force is smaller than an inter-layer adhesion force (see Abstract and page 6, line 4 through page 7, line 14). Therefore, it would have been obvious for one of ordinary skill in the art to have provided a first train of low-powered laser pulses to drill a hole in a multilayered-sheet as taught by WO 86/02301 in the process of Ayrton ('456), because WO 86/02301 specifically teaches that low-powered laser pulses avoid delamination of said multi-layered sheet, whereas Ayrton ('456) teaches laser drilling in a multi-layered sheet while avoiding delamination of said multi-layered sheet, hence both references solving the similar problem of delamination of a multi-layered sheet while drilling holes therein.

Further regarding claim 1, although WO 86/02301 teaches a second train of higher power pulses, the process of Ayrton ('456) in view of WO 86/02301 does not teach trimming said drilled hole in a multi-layered sheet. Temple *et al.* ('311) teach laser drilling a hole in which the laser power is increased at the end of the drilling process in order to trim the final shape of said drilled hole (see col. 7, lines 1-11). Therefore, it would have been obvious for one of ordinary skill in the art to have provided a second train of higher power pulses as taught by WO 86/02301 to trim said drilled hole as taught by Temple *et al.* ('311) in the process of Ayrton ('456) because, Temple *et al.* ('311) specifically teach that increasing the power of said laser results in an improved internal finish of said drilled hole, hence an improved product is obtained. Furthermore, it should be noted that Temple *et al.* ('311) specifically teach maintaining the laser power low at the beginning of the drilling process in order to avoid damage due to exhaust products, hence teaching a similar two-step laser drilling process as WO 86/02301.

Regarding claims 2 and 3, WO 86/02301 teaches altering the pulse width and peak energy (see Abstract and page 6, lines 20-25). Therefore, it would have been obvious for one of ordinary skill in the art to have altered the pulse width and peak energy for a second train of higher power pulses as compared to a first train of laser pulses taught by WO 86/02301 to drill and trim said hole as taught by Temple *et al.* ('311) in the process of Ayrton ('456) because, WO 86/02301 specifically teaches that low-powered laser pulses avoid delamination of said multi-layered sheet, whereas Temple *et al.* ('311) specifically teach that altering the power of said laser results in an improved internal finish of said drilled hole, hence an improved product is obtained.

8. Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 86/02301 in view of Temple *et al.* (US Patent No. 6,228,311 B1).

WO 86/02301 teaches the basic claimed process of laser drilling a multi-layer sheet by providing a train of low-powered laser pulses to drill through said multi-layered sheet, said low powered pulses preventing delamination, and after said multi-layered sheet has been drilled, higher power pulses are employed. It is submitted that since delamination is avoided, that the resulting inter-layer pull-off force is smaller than an inter-layer adhesion force (see Abstract and page 6, line 4 through page 7, line 14).

Regarding claim 1, although WO 86/02301 teaches a second train of high-powered pulses WO 86/02301 does not teach trimming said drilled hole using a second train of high-powered laser pulses. Temple *et al.* ('311) teach laser drilling a hole in which the laser power is increased at the end of the drilling process in order to trim the final shape of said drilled hole (see col. 7, lines 1-11). Therefore, it would have been obvious for one of ordinary skill in the art to have provided a second train of high-power pulses to trim said drilled hole as taught by Temple *et al.* ('311) in the process of WO 86/02301 because, Temple *et al.* ('311) specifically teach that increasing the power of said laser results in an improved internal finish of said drilled hole, hence an improved product is obtained. Furthermore, it should be noted that Temple *et al.* ('311) specifically teach maintaining the laser power low at the beginning of the drilling process in order to avoid damage due to exhaust products, hence both references teaching a similar two-step laser drilling process.

In regard claims 2 and 3, WO 86/02301 teaches altering the pulse width and peak energy (see Abstract and page 6, lines 20-25).

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Conclusion

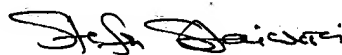
9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stefan Staicovici, Ph.D. whose telephone number is (703) 305-0396. The examiner can normally be reached on Monday-Friday 8:00 AM to 5:30 PM and alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jan H. Silbaugh, can be reached at (703) 308-3829. The fax phone number for this Group is (703) 305-7718.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0661.

Stefan Staicovici, PhD



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October 31, 2002